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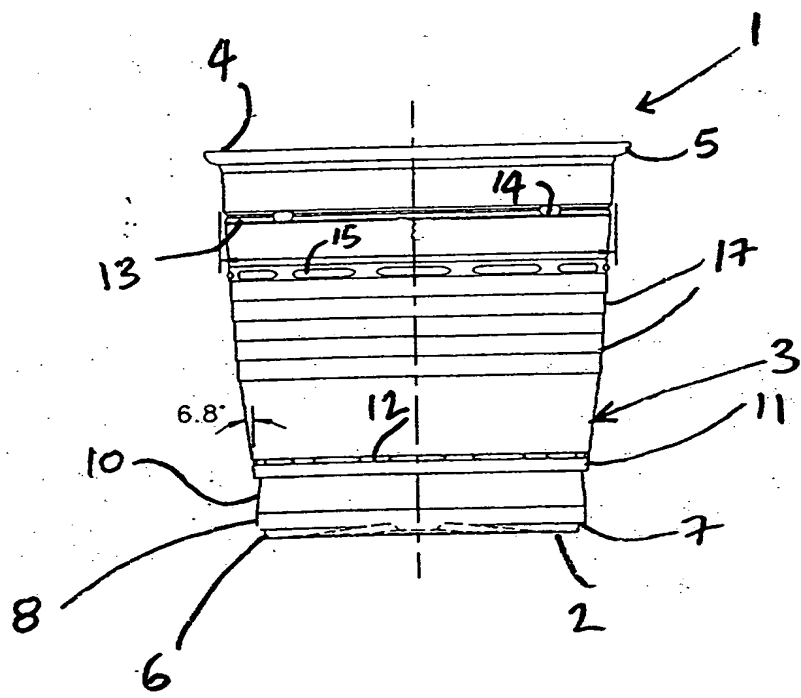
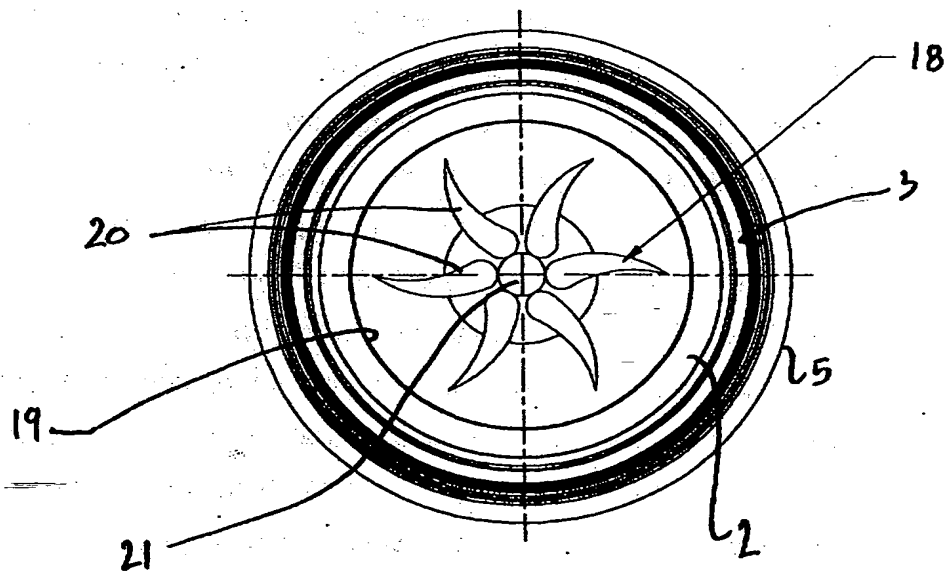
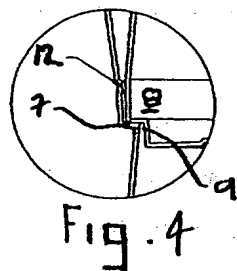
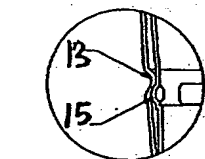
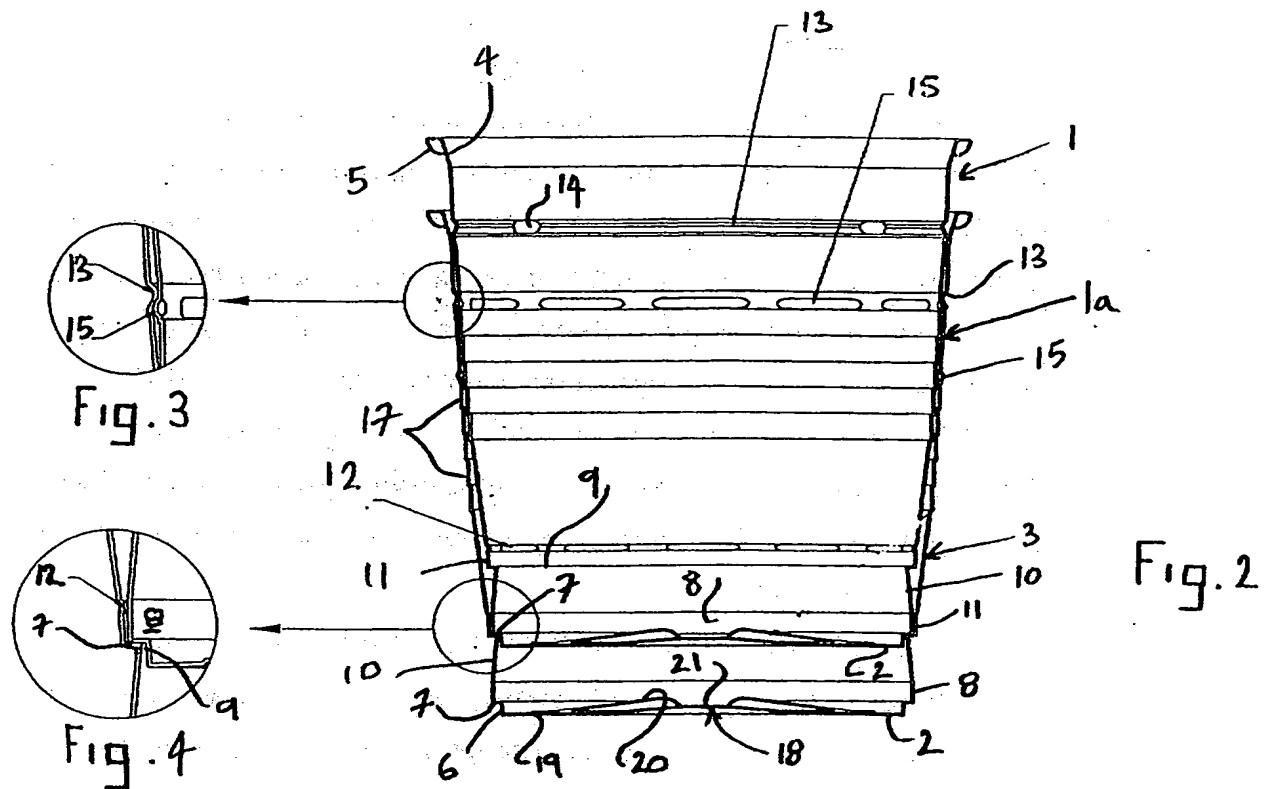


Fig. 1



- 1 -

DRINKING CUPS

The present invention relates to drinking cups and, more particularly, to disposable drinking cups which can be stacked in nested relation with one another for dispensing from an automatic vending machine and which are designed to contain powdered or granular drinking ingredients when stacked. Such cups are commonly referred to as "in-cup" vending cups and, when arranged in a stack, an ingredient compartment is formed between one cup and the next cup above in the stack. The ingredients are trapped in this ingredient compartment ready to make a drink by the addition of water when a cup is pulled from the bottom of the stack and is dispensed by the mechanism of the vending machine.

Typically, disposable drinking cups of the "in-cup" type are formed as a thin-walled seamless product from sheet plastics material, such as, high impact polystyrene. The cups comprise a bottom wall and a sidewall extending upwardly and generally outwardly from the bottom wall to a mouth at the top of the cup. To permit the cups to be stacked in nested relation and reduce the risk of the stack being compacted and the cups wedging together, the sidewalls of the cups are formed with external and internal stacking shoulders such that when the cups are stacked, the external stacking shoulder of an upper or inner cup of the stack rests on the internal stacking shoulder of the next lower or outer cup of the stack in order to resist full insertion of the upper cup into the lower cup and provide an ingredients compartment between the bottom walls of the two nested cups. The sidewalls of the cups may also be formed with mutually engaging surfaces which resist frictional separation of the cups in order to maintain the stack as an integral unit until the application of a predetermined axial pull, such as, that exerted by an automatic vending machine. Ingredients are contained and stored in the bottoms of the cups in the ingredient compartments formed between the cups in the stack. Such a stack may be stored, handled and subsequently loaded into a vending machine as an integral unit from which each cup is removed from the bottom of the stack by the mechanism of the vending machine.

preparatory to hot water being poured into the cup to mix with the ingredients and produce a drink.

GB-A-1 564 097 describes an "in-cup" disposable vending cup in which the sidewall of the cup has a lower stacking surface and an upper stacking shoulder adjacent the bottom wall of the cup, and a projection adjacent the cup mouth and at the bottom end of a annular sidewall section having a slight reverse taper. When stacked in nested relation with like cups, the lower stacking surface seats on the upper stacking shoulder of an identical lower cup and the external projection adjacent the mouth of the cup is an interference fit with the reversed tapered annular portion of the lower cup. The arrangement is designed to provide location against tilting of one cup in relation to another in a stack, to seal the ingredient compartment between the bottoms of two nested cups and the outside of the nested pair, and to prevent cup separation without a predetermined axial pull.

It is an object of the present invention to provide a disposable drinking cup of the "in-cup" type which has a bottom wall internally configured to assist mixing of the ingredients and water when water is poured into the cup. It is another object to provide a disposable drinking cup of the "in-cup" type which can be stacked in nested relation with a multiplicity of like cups to provide a stack with improved rigidity and compaction resistance.

The invention consists in a drinking cup comprising a bottom wall, a sidewall extending upwardly and generally outwardly from the bottom wall to a mouth at the top of the cup, an external stacking surface at or adjacent the bottom wall, an internal stacking shoulder formed on the sidewall at a position spaced above the stacking surface, whereby when the cup is stacked in nested relation with a like cup, the external stacking surface of the upper cup seats on the internal stacking shoulder of the lower cup, and swirl means formed internally on the bottom wall of the cup for producing a rotary movement of the mixture of ingredients and water when water is poured into the cup.

The swirl means may comprise a generally radial array of arcuate ribs embossed on the inside of the bottom wall of the cup and disposed centrally thereof, preferably, about an unembossed central portion of the bottom wall, the arcuate ribs curling radially outwardly from the centre portion in the same direction. The outer ends of the ribs may terminate at positions spaced inwardly from the sidewall of the cup. They may taper towards their radially outer ends and be of arcuate cross section. The inner ends of the ribs may be of part spherical shape and be slightly spaced apart from each other.

When the cup is stacked in nested relation with a like cup, the external stacking surface of the upper cup seats on the internal stacking shoulder of the lower cup to form an ingredient compartment between the bottom walls of the two stacked cups. Drink ingredients are contained in the ingredient compartments on the bottom walls of the cups, and the swirl means assists dispersion of these ingredients in water, so as to improve the quality of the drink, when water is poured into a cup after removal from the stack.

Conveniently, upper and lower internal and external latching protuberances are formed on the sidewall adjacent the mouth, whereby when the external stacking surface of the upper cup is seated on the internal stacking shoulder of the lower cup, the external latching protuberance of the upper cup engages beneath the internal latching protuberance of the lower cup.

Preferably, the sidewall of the cup is configured adjacent the lower external stacking surface and adjacent the internal stacking shoulder such as to provide an interference fit between the upper and lower cup adjacent the upper stacking shoulder of the lower cup, when the two cups are nested together.

A preferred embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a side view of the cup,

Figure 2 is an axial section through two cups as shown in Figure 1 stacked in nested relation,

Figures 3 and 4 are fragmentary views on an enlarged scale of the details ringed in Figure 3, and

Figure 5 is a bottom plan view, more particularly, illustrating the swirl feature moulded on the bottom wall of the cup.

- 5 Referring to Figures 1 and 2 of the accompanying drawings, the disposable drinking cup 1 is a thin walled seamless product thermoformed from sheet plastics material, such as, high impact polystyrene. It is of circular shape in plan and comprises a bottom wall 2 and a sidewall 3 extending upwardly and generally outwardly from the bottom wall to a mouth 4 at its top.
- 10 The mouth is surrounded by a hollow rim flange 5 curled outwardly from the sidewall of the cup.

- The bottom wall 2 of the cup is joined to the sidewall 3 by an annular step 6 which forms an external lower, stacking surface or shoulder 7 adjacent the bottom wall of the cup. Extending upwardly from the stacking shoulder is
- 15 an annular substantially vertical, sidewall section 8 which is joined to an internal, upper, stacking shoulder 9 by a sidewall section 10 of slight reverse taper. Extending above the internal stacking shoulder 9 for a small distance is a second annular, substantially vertical, sidewall section 11 which, at its upper end, terminates in a ring D of spaced, circumferentially extending
- 20 protuberances 12 which project internally of the cup to a small extent. Above the ring of protuberances 12 is the major part of the sidewall of the cup. It is of frustconical shape and diverges upwardly to the mouth 4 where it terminates in the hollow rim flange 5. At a position spaced below the mouth, the sidewall is moulded with a hollow internal, annular, latching rib 13 which is interrupted
- 25 at equally and well spaced positions about the sidewall by sections 14 moulded flush with the adjacent sidewall portions for strengthening purposes. Below the internal rib is a ring of hollow, external, latching protuberances 15. These protuberances extend circumferentially of the sidewall at equally spaced positions about the sidewall so that the ring is generally of scalloped
- 30 configuration. The spacing of this scalloped ring below the internal latching rib 13 is such that, when two identical cups are stacked in nested relation, the

scalloped ring of external protuberances 15 engages below the internal latching rib 13 as the lower stacking shoulder 7 of the inner cup seats on the upper stacking shoulder 9 of the outer cup, as will be referred to in more detail below.

5 Below the scalloped ring of protuberances 15, the sidewall is formed on its outside with a series of consecutive, annular, hollow ribs 17 which serve to strengthen the sidewall and as a gripping area where the cup may be gripped between the fingers by a user.

10 The inside of the bottom wall 2 of the cup is moulded with a swirl feature 18 which is designed to produce a rotational movement of the mixture of ingredients and water when water is poured into the cup to make a drink (see also Figure 4). The bottom wall is moulded on its outside with a concentric, shallow, circular recess 19 and the swirl feature comprises a generally radial array of hollow arcuate ribs 20 embossed on the inside of the
15 bottom wall centrally of the recess 19. The ribs 20 are disposed about a central unembossed portion 21 of the recess and curl outwardly from this central portion in the same direction. The radially outer ends of the ribs terminate at positions spaced from the periphery of the recess and, hence, the sidewall of the cup. They are of arcuate cross section and taper towards
20 their outer ends. The inner ends are slightly spaced from each other about the central portion 21 and are of part spherical shape.

 In use, a multiplicity of cups as described above are stacked in nested relation after a predetermined amount of a selected drink ingredient has been deposited into the bottom of each cup. As illustrated particularly in Figure 2,
25 when stacked in nested relation, the scalloped ring of latching protuberances 15 of an upper cup snaps over the internal latching rib 13 of the next lower cup 1a in order to engage beneath the internal latching rib 13 and retain the cups latched in nested relation. At the same time, the lower stacking shoulder 7 of the inner cup seats on the internal stacking shoulder 9 of the outer cup
30 and the ring of protuberances 12 of the outer cup frictionally engage with the vertical sidewall section 8 extending above the external stacking shoulder 7 of

the upper cup. This arrangement affords the stack of cups rigidity and compaction resistance. Also, the ingredients deposited on the bottom wall of the lower cup 1a are trapped in the ingredient compartment formed between the bottom walls 2 of the two nested cups and the arrangement effectively prevents ingredients from migrating from the ingredient compartment to the next cup above.

The latching effect provided by the latching rib 13 and the ring of latching protuberances 15 and the interference fit between the ring of protuberances 12 and the vertical sidewall section 8 serve to retain a stack of cups in nested relation unless subjected to a predetermined axial pull, such as, is exerted by the mechanism of an automatic vending machine which pulls a lower cup from the stack preparatory to pouring hot water into the ingredients contained on the bottom wall of the cup. When water is poured onto the ingredients, the swirl feature 18 in the bottom wall of the cup produces a rotational movement of the mixture of ingredients and water so as to improve the dispersion of the ingredients within the water and the quality of the resulting drink.

Whilst a particular embodiment has been described, it will be understood that modifications can be made without departing from the scope of the invention as defined by the appended claims.

CLAIMS

1. A drinking cup comprising a bottom wall, a sidewall extending
5 upwardly and generally outwardly from the bottom wall to a mouth at the top
of the cup, an external stacking surface at or adjacent the bottom wall, an
internal stacking shoulder formed on the sidewall at a position spaced above
the stacking surface, whereby when the cup is stacked in nested relation with
10 a like cup, the external stacking surface of the upper cup seats on the internal
stacking shoulder of the lower cup, and swirl means formed internally on the
bottom wall of the cup for producing a rotary movement of the mixture of
ingredients and water when the water is poured into the cup.
2. A drinking cup as claimed in claim 1, wherein the swirl means
15 comprises a generally radial array of arcuate ribs embossed on the inside of
the bottom wall of the cup.
3. A drinking cup as claimed in claim 2, wherein the array of
arcuate ribs is disposed centrally of the bottom wall about an unembossed
central portion of the bottom wall.
4. A drinking cup as claimed in claim 2 or 3, wherein the arcuate
20 ribs curl radially outwardly in the same direction.
5. A drinking cup as claimed in claim 2, 3, or 4, wherein outer ends
of the arcuate ribs terminate at positions spaced inwardly from the sidewall of
the cup.
6. A drinking cup as claimed in any of claims 2 to 5, wherein the
25 arcuate ribs taper towards the outer ends thereof.
7. A drinking cup as claimed in any of claims 2 to 6, wherein the
inner ends of the arcuate ribs are of part spherical shape.
8. A drinking cup as claimed in any of claims 2 to 7, wherein the
arcuate ribs are of arcuate cross section.
- 30 9. A drinking cup as claimed in any of claims 2 to 8, wherein the
inner ends of the arcuate ribs are spaced apart from each other.

10. A drinking cup as claimed in any of the preceding claims including upper and lower internal and external latching protuberances formed on the sidewall adjacent the mouth, whereby when the external stacking surface of the upper cup seats on the internal stacking shoulder of the lower cup, the external latching protuberance of the upper cup engages beneath the internal latching protuberance of the lower cup.

11. A drinking cup as claimed in any of the preceding claims, wherein the sidewall is configured adjacent the lower external stacking surface and adjacent the internal stacking shoulder, such as to produce an interference fit between the upper and lower cup adjacent the upper stacking shoulder of the lower cup, when two cups are stacked in nested relation.

12. A drinking cup constructed and arranged substantially as hereinbefore described with reference to the accompanying drawings.



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Examiner: Dr Fatema
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Claims searched: 1-12

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**Patents Act 1977
Search Report under Section 17**

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.Q): A4A (AB, AM, AN)

Int CI (Ed.6): A47G 19/22, 19/23

Other: Online: EPODOC, WPI, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
Y	GB 2073581 A	(LIN PAC) lines 82 to 92 and lines 93 to 104 of page 1.	1-3, 5, 6, 8-11
Y	GB 1564097	(KELLY) lines 35 to 50 of page 2.	1-3, 5, 6, 8-11
Y	GB 1266909	(IMPROMEX AG) line 73 of page 1 to line 11 of page 2.	1-3, 5, 6, 8-11
Y	GB 974241	(ILLINOIS TOOL WORKS) lines 54 to 62 of page 2.	1-3, 5, 6, 8, 9, 11

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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